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EDITORIAL

On these pages the editor offers his opinions, unshackled by advertising patrons and unrestrained by anything save a sense of the decent and the truthful—the editor, alone, is responsible for their type, their tone and their tenor.

"LIFE IS A NEW CREATION"

A CHEMICAL theory of the origin of species was presented in a paper recently published by Dr. Victor C. Vaughan, formerly head of the Medical School of the University of Michigan, and a noted authority on evolution. He goes far back beyond Darwin to a period long before the appearance of the earliest and simplest single-celled plant or animal, which is the point where the biologist begins.* For he believes that Life is molecular and not cellular. According to him the size and shape of the little bags of protoplasm which we call cells, are less important than the composition of their contents. He believes that all life is chemical. Yet Life does seem a bit concerned with state and physical form, for Life is colloid, and as it finds expression in us, it seemingly abhors the crystal. Full of curves is Life, and shy on plane geometry. And truly our bodies do seem to outlaw the crystal. The crystallizable is tolerated; the crystallized is outlawed or ousted. Witness the cholesterol and other crystals of the gall stone, the calculi of kidney or bladder, the uric acid rosettes,—the phosphate prism, the heart stone, the eye stone, the bloody bezoar,—how the contrivances of the body will either wall them off or will them out.

Know that, as man approaches the twilight zone of his short day of stay this side of heaven, the electric forces that had reached their peak at forty, are nigh well spent at seventy. Senescence has brought obsolescence, an obsolescence beyond repair, for life has lost its atomic discipline. Rebellious molecules no longer go their lively colloid way —but choose a crystal destiny. Rocking in his second cradle, the old man surrenders to a linear lullaby that eventually charms him to his long and longed for sleep. Eyes that once had sparkled in liquid ecstasy are dimmed with a dank deposit. Arteries that in days gone by had bulged with gay abandon when emotion-thrilled blood cells

*Long before the first Darwinian monkey scraped his shinbones sliding down the prehistoric pine in his haste to achieve to manhood, life was already evolved and involved. The origin of the species was a much simpler organization than the monkey or the jelly fish or even the amœba.

bounced against their sides, are now as unbending and brittle as bars of burnt fudge. The rhythm of his rocking chair keeps time to the tune of cracking arteries, and death will come to him at last—not with its mythical sickle or scythe, but with the poignant points of a million crystal clusters.

Life, as we live it, is Colloid—Death, as we dread it, is crystal.

Yet withal if ever it be given to man to discover where life started, it may be found to have started not with the cell—but with the molecule—not with the curve but with the line and the angle—not with the colloid but strangely enough with the crystal. Yet we speak of the crystal itself as lifeless.

But what is entrancing about the "lifeless" crystal is the inanimate activity (if these two words be compatible) occurring in the molecular mobs that build it.

And what a governed, regulated activity it is. Consider the intimate growth of a clear crystal from the depths of a murky fluid. Were our ears attuned to the noise of busy microcosmic entities what clamor would come from that liquid. Could our polarized eyes discern the whirling, seething mob of molecules, they would be blinded as with a strange dizziness. Tiny particles, builders of every crystal, dance about in Brownian ecstasy searching frantically for the attractive nucleus. Finding it they come to rest beneath its ramparts and from all directions they draw their cohorts to the coalescence and only the proven pure can join the congregation.

Atom upon atom, particle upon particle, and sheath over sheath the crystal is built—gradual, orderly and certain. Finally facet and face and edge, definite in every detail, effect the form of the pure and perfect crystal. And the dross, the foreign and the colloid things are left behind in the fluid for only the actual, belonging things find room in the mass of the crystal.

What a thing of system and sheer symmetry this finished crystal is and how well it knows its geometry. And how well it knows its own mind. For it rarely, and then only with reason, varies from its ordered major pattern, every component atom sitting gaily by its lattice window—waiting the great adventure.

It has been stated as a statistical truth that everything strives toward symmetry so far as the environment will allow—an aphorism in which rests not only the way of the crystal but the salvation of mankind as well. But we can ascribe neither instinct nor conscience to

the crystal, its symmetric expression is as yet a confidence of atoms—a secret of the lesser infinities.

For the crystal—in spite of the obvious activity that governed its growth, is called inanimate—dead. Polarity, explains one—another says electronic motivation. But is it? How does the Brownian ecstasy differ from other life? Is it here that Life began?

But let us cease this unachieving soliloquy—for whether Adam or the Atom was the primal daddy of us all, whether Eve or Ion mothered all things living, certain it is that life is real—life is earnest—and the grave is never its goal. The poet—if poet—who penned the following querulous, quarrelsome lines, expresses something at least of the dilemma of all who rely on less than Faith to answer the burning question—

Gather—O Cells—rub against each other
In your bed of slime—rub against each other,
Ooze your protoplasmic oil
Warm, anointing, cosmic oil
Grease the wheels that rule my head,
Prove to me before I'm dead
With your lush electric thinking
Hush this wild, erratic blinking.
Tell me—tell me—why I am—
Whence I am—What I am—Where I am—Am I?
Did God—if God—out of the Clod
Carve me—His image—out of the sod?
Why did He? How did He? When did He?
Does He at all
Know I exist? Cares He at all
Whether I rise—Whether I fall?
Whether I've been—Here—at all?

Much more comforting is the viewpoint of Sir Alexander Findlay: "Although we must recognize the essential importance of colloidal matter in connection with the phenomena of life, and that matter in the colloidal state is the vehicle of life; although, further, we may interpret much of the behavior of living matter in terms of physics and chemistry, I am of the opinion that we cannot explain life itself in terms of physical science. There seems to be no continuity between inanimate colloidal matter and living matter; but there is a distinct and sharp break in the curve of relations. In other words, life is a new factor, a new set of potentialities, introduced into inanimate matter. LIFE IS A NEW CREATION."

IVOR GRIFFITH.

ORIGINAL ARTICLES

YEASTS IN THE NORMAL MOUTH *

By Francis C. Lawler, A. B., M. Sc., D. Sc.

Eight out of ten have it! That is, yeast organisms in the mouth. The author's presentation of the subject is preliminary to further study.

*Thesis presented to the faculty of the Philadelphia College of Pharmacy and Science in partial fulfillment of the requirements for the degree D. Sc. in Bacteriology.

A BRIEF literature and history are given dealing with data concerning yeasts. The occurrence of the latter in the normal mouth, which is the main concern of this investigation is also recorded, though the available information is not extensive. In contrast the following is cited pertaining to yeast-like forms.

The history of fermentation dates back to the ancients, the phenomena being recognized but not the causative agents. Yeast and other enzymes were definitely recognized in the latter part of the nineteenth century.

Eber's Papyrus (1), the oldest technical work extant written in 1500 B. C. noted that a yeast-like substance was used therapeutically at that time. Hippocrates (2), and Pliny (3) the elder used a yeast-like substance as medical aids. The Bible (Exodus 13:17), (4) refers to yeast indirectly in relation to unleavened bread. Leuwenhoek (5) in 1660 made the first microscopic examination of probable yeast-like organisms, and identified them as round or ovoid particles. The term "yeast" was adopted by Kuehne from the Greek word "enzyme".

Becker (6), Cavendish (7), and Lavoisier (8), concerned themselves with a study of the fermentative reactions. Thenard (9) observed the marked similarity of precipitates of fermented solutions and brewer's yeast. Exleben (10), Latour (11), Schwann (12) and Keutzing (13) all observed the fact that yeast was very definitely a living cell.

Liebig (14) and Pasteur (15) engaged in a controversy over the question of whether or not yeast was a living organism. Pasteur's

views, which were accepted were that, "The yeast is a living organism, nourished and reproduced—and not as Liebig assumes, a transformation product of plant albumin."

Most workers and in particular Traube (16), Brown and Ball (17) were primarily interested with the fermentative powers of yeasts.

Occurence

Yeasts are found free in nature at almost every place that sugar is found, in nectar of flowers, food materials, tree saps, fruit surfaces, soils, plants and very extensively on insects. The latter are undoubtedly the agents concerned in placing yeasts on fruits and plants. To a secondary degree, wind distributes yeasts from the soil.

Yeasts are found on foods and in foods and, especially so, in preserved foods, bacteria-free due to high acidity or osmotic pressure. Yeasts can grow in dairy products such as cream, butter and cheese even to the extent of being the large percentage of the flora in Camembert cheese. Macy and Richie (18) found as high as 90,000 yeasts per cubic centimeter in such products. Harrison (19), found yeasts in all products he studied.

All higher animals consume yeasts as a component part of their food, and accordingly yeasts have been found frequently in the alimentary tract of man. Anderson (20) showed that yeasts in general passed through the intestinal tract uninjured and demonstrated their presence in feces. Bessey (21), stated that some yeasts are present in the alimentary canals of man and other animals. Rettger, Reddish, and MacAlpine (22), however stated that baker's yeast in passing along the alimentary tract was destroyed.

Review of Literature

The literature concerning the presence of yeasts in the mouth and pharynx of man is not extensive. Few of the worker's report the technique used by them in isolating the yeasts found.

Tanner, Lampert, and Lampert (23) showed yeasts to be present in 10 per cent. of the throats they examined and that eighteen of forty-seven strains were pathogenic for mice.

Rich and Fox (24), prepared a sterile centrifuge tube half filled with sputum to which 10 per cent. antiformin of equal amount was

added. The tube was shaken and incubated at 37 degrees Centigrade for one hour, and then centrifuged at high speed for five minutes. The supernatant fluid was decanted and the residue was used for study. A large loopful was streaked on two Sabouraud media plates (pH 6.0). The latter were inverted and incubated at 37 degrees Centigrade for twenty-four hours and then at room temperature for fifteen days with daily observation. One loopful was examined under high and low magnification for filaments, spores, yeasts, and like structures. If colonies were not of a bacterial nature on Sabouraud plates, transplants were made to Sabouraud slants, and to 1 per cent. glucose agar. Twenty-four strains from one hundred and forty-one sputums were isolated by this technique.

Stovall and Bubolz (25), found Saccharomyces from throats reacting thus: acid and gas in glucose, mannose, levulose, maltose, galactose, saccharose and raffinose. Nutrient agar colonies were pin point in forty-eight hours. Blood serum yielded pin point colonies, smooth, elevated, moist, white, and glistening. Growth on gelatin was negative in thirty days, as was that in litmus milk. Anaerobiasis yielded good growth. It was non-pathogenic for mice, guinea pigs or rabbits.

Stovall and Bubolz (26), utilized dextrose, levulose, mannose maltose, galactose, saccharose, lactose, inulin raffinose, dextrin and colonies on malt agar for forty-eight hours, 10 per cent. gelatin, and milk. Sugars were made up in Liebig's extract broth, 1 per cent. and the pH adjusted to 7.2. Inoculations were made from a forty-eight-hour agar slant and incubated for seven days. Acid and gas were recorded.

Miller (27) found harmless bud fungi constantly in the mouth and also Oidium lactis (milk mold). Castellani (28) found yeasts frequently from tongue scrapings. Steinfeld (29) found Monilia, Cryptococcus and Endomyces in sputum of asthma and chronic bronchitis cases. Franci (30), found Hyphomyces of ten different species in thirteen cultures of fifty-one cases of oral lesions. McNevin and Vaughan (31), stated that yeasts were common in the mouth, and especially if carbohydrates were eaten. Goadby (32) stated yeast forms were found in the majority of human mouths.

Henrici (33), stated that it was difficult to analyze the literature, which is more or less extensive on yeast infections of man. Many reported organisms were definitely not yeasts, but were of Oidium

dermatitidis or Monilia albicans that form mycelium in lesions or cultures.

Definitions and Comparisons

Yeasts, defined in the broad sense, are said to be fungi that permanently maintain a unicellular growth and do not form mycelium. The classification by Guillermond (34) is one quoted by Henrici. Henrici (33) stated that Saccharomyces and related forms of true yeasts never form mycelium, exist as single cells and reproduce by budding. They form spores either by conjugation of neighboring cells or by parthenogenesis. He divided the Saccharomyces genus by their reactions on dextrose, lactose, maltose and saccharose.

In the British System of Bacteriology (36), the sugars, saccarose, raffinose, levulose, maltose, galactose, and mannose are utilized in identifying and differentiating the yeasts. Giant colony formation is utilized along with hanging drop agar or gelatin. The top and bottom of culture are observed for pellicle character.

Gwynn-Vaughan (35), regards yeasts as cells which only rarely form mycelium, are essentially non-pathogenic and multiply by budding.

In this investigation, the term "yeasts" is applied to unicellular organisms that do not form mycelium, and reproduce typically by budding. The cells are round or oval. The cells average from two to four microns in size. The size of the individual cell may vary in the same culture. Sabouraud's medium shows the yeast colonies becoming considerably larger than the commonly observed bacterial colonies, starting from a pin point size in twenty-four hours. The colonies in young cultures are circular, markedly raised, smooth, glistening white, and usually entire, but in some older cultures especially on giant center inoculations, a radiating fringe-like appearance was noted. On Sabouraud's media the colonies often reached a size of 30-35 centimeters; however on streak or pour plates the maximum size was 3 to 7 centimeters.

The pellicle growth as observed in this investigation was essentially of the bottom producing type, so that at the time of final observations (120 hours), the pellicle formed a heavy precipitate in the bottom of the tube.

Purpose of Investigation

Yeasts have been found in human mouths in isolated cases, but their incidence has not been determined. Most workers have been apparently not concerned with a determination of the number of normal individuals harboring yeasts in their oral flora. In this research which concerns itself with procedures of determining the incidence of yeast in the normal mouth, it was deemed advisable to group the yeasts isolated by their fermentative properties and pellicle production on four sugars, namely maltose, lactose, saccharose and dextrose. The investigation therefore, consisted in a determination of the incidence of yeasts as a part of the normal mouth flora; and a general grouping of the yeasts isolated by fermentative properties and pellicle production on the four above-named sugars.

There are many problems in an investigation such as this which should be considered as: the dietic factors evolved; the presence of other micro-organisms and cellular elements; the many techniques available for isolating yeasts; the classification of the yeasts isolated by studying more thoroughly cultural and biochemical behaviors, etc. This investigation was directed toward the main objective of noting the incidence of yeasts in a group of normal individuals (primarily a student group).

Technique

All samples were collected upon arising in the morning and before cleansing of the teeth.

The procedure followed in this first group was chiefly as follows:

1. A salivary specimen of approximately 3 cubic centimeters was obtained at nine o'clock (A. M.) in a sterile tube by allowing direct expectoration into the tube. This was diluted to 10 cubic centimeters with sterile saline solution.

2. A cotton swab was rubbed along the teeth and gum line and this was shaken well with 10 cubic centimeters of sterile saline solution.

3. Each of the above specimens were centrifugalized for twenty minutes.

4. The sediment was washed three times, the centrifuging time being twenty minutes for each; and this was then diluted to 2 cubic centimeters with sterile saline solution.

5. A microscopic examination was made of both the salivary and swab specimens after the above treatment; a dilute fuchsin stain was used.

6. Sabouraud's medium was inoculated by center inoculation for giant colony formation and by streak inoculation using an amount of two loopfuls of material. Plates were made in duplicate.

7. All plates were incubated for twenty-four hours at 37° C., followed by incubation for seven days at room temperature; daily observations were made.

8. Colonies developing were examined separately. All yeast colonies were investigated individually and then fished to Sabouraud's conservation media, so that if six yeast colonies were obtained from one individual case, each was examined to observe cultural and biochemical behaviors.

9. Inoculations were made in Liebig's meat extract broth containing 2 per cent. of the four respective sugars to determine fermentative properties and pellicle formation.

10. In this preliminary group the samples were collected at nine to ten o'clock after breakfast, but a record was kept of the kind of food ingested.

11. A record was kept as to the condition of the mouth, teeth and gums.

The incubation was carried out at 37° Centigrade and inasmuch as this is above the optimum temperature of yeast, the incubation time was extended to one hundred and twenty hours. Daily observations were made but the fermentative property as listed was based on the one hundred and twenty hour period. The pellicle production was determined using a similar temperature and incubation period.

In isolating yeasts from solid culture media (Sabouraud's) the colonies were recognizable after twenty-four hours' incubation. The colonies were small, pin point in size, smooth, elevated, moist, white, glistening and entire. In older cultures of one week a radiating fringe-like appearance was noted. It was at the end of one week incubation that the colonies were fished and placed on conservation media slants.

In the initial group of preliminary specimens examined to detect the presence of yeasts, there were a total of thirty-eight individuals.

CHART I

COMPOSITE OF YEAST CULTURES ISOLATED FROM INITIAL THIRTY-EIGHT CASES

No. of colonies	Fermentation Dextrose	Maltose	Sucrose	Lactose	Dextrose	Maltose	Sucrose	Lactose	Case Number
4	X	X	—	—	X	X	X	X	I
6	X	X	—	—	X	X	X	X	II
3	X	X	—	—	X	X	X	X	III
2	X	—	—	—	X	X	X	X	IV
4	X	X	—	—	X	X	X	X	V
4	X	—	—	—	X	X	X	X	IX
4	X	X	—	—	X	X	X	X	X
4	—	—	—	—	—	—	—	—	XII
5	X	X	—	—	—	—	—	—	XX
4	—	—	—	—	—	—	—	—	XXV
6	X	X	—	—	X	X	X	X	XXIX
6	X	X	—	—	X	X	X	X	XXX
3	—	—	—	—	—	—	—	—	XXXIII
4	X	X	—	—	X	X	—	—	XXXIV
4	X	X	—	—	X	X	X	X	XXXVI
4	—	—	—	—	—	—	—	—	XXXVIII

In this preliminary set of thirty-eight specimens, sixteen were found to be positive and twenty-two found to be negative for yeasts. Both females were negative.

From the sixteen yeast positive individuals, as noted in Chart Number 1, three types of yeasts were isolated, which varied in their fermentative properties and pellicle production. One type fermented dextrose and maltose, but not saccharose or lactose. The second type fermented dextrose, but not saccharose, maltose or lactose. A third type did not ferment or form a pellicle with these four sugars.

The three types were constant insofar as the individual cases were concerned, as all cultures from the same individual were of the same type insofar as their reactions on these four sugars.

Modification of Culture Technique

To determine whether a larger percentage of individuals normally harbored yeasts in their mouth and pharynx, the previously outlined technique was modified and a series of experiments were carried out as follows:

Procedure I

A sample lot of ten cases (all males) were selected from the thirty-eight cases in the preliminary investigation; those selected were

Numbers 2, 3, 25, 33, 38 (all positive cases) and 6, 13, 26, 17 and 35 (all negative cases). Samples were collected by allowing the individual to rinse their mouths with 10 cubic centimeters of sterile saline solution, which was then subjected to the same technique as outlined in the preliminary investigation. Ten cubic centimeters were chosen because this amount was one conveniently held in the mouth. In this group of ten, five cases were found to be positive and five negative for yeasts; the findings being identical with those in the preliminary series.

Procedure II

It was thought that the amount of inoculum might be insufficient in amount. Accordingly a series of plates were made in which one, five-tenths and one-tenth cubic centimeters of yeast positive salivary secretion were used as amounts of inoculum. The results of this variation in technique were that larger numbers of yeast colonies were observed on these plates (Sabouraud's), and the numbers were directly proportional to the amount of inoculum used; e. g., the larger the amount of inoculum, the greater the number of yeast colonies. As a point of interest it was observed that numerous subsurface colonies also developed. There being a possibility that anaerobic yeasts might be present some of the colonies were fished out and inoculated into dextrose broth and incubated at 37° Centigrade. A microscopic examination disclosed the colonies to be spore-formers.

A liquid medium was thought would be of value in increasing the number of yeast positive cases. Pasteur's medium (later with 2 per cent. agar base) was selected after trying Pasteur's, Czapek's, and Dox and Thom's solutions.

Modification of Original Technique

(Final Thirty Cases)

The following procedure employed for the thirty cases was introduced using a modification of the original technique and culture media not used previously.

Thirty individuals were selected and of these Numbers I, II, III, VI, VIII, XII, XIV, XV, XVI, XVII, XVIII, XX?, XXI, XXII, XXVI, XXVIII, XXIX, XXX, XXXI, XXXII, XXXV, were cases examined in the preliminary series, while Numbers XXXIX, and XLVI were new cases.

1. A salivary specimen of 3 cubic centimeters was obtained from each individual by allowing the individual to deliver this amount directly into a sterile tube.

2. A sterile cotton swab was rubbed along the teeth and gum line.

3. A specimen was collected by allowing the individual to rinse the mouth with 10 cubic centimeters of sterile saline solution for a period of twenty seconds and then returning the rinse directly to the tube.

4. All the above specimens were collected at the same time in the order mentioned and were made up to a volume of 10 cubic centimeters with sterile saline solution and centrifuged for a period of twenty minutes.

5. Each specimen was washed and recentrifuged three consecutive times and a final dilution made of 2 cubic centimeters with sterile saline solution.

6. A microscopic examination was made of the three specimens employing Gram's technique and dilute fuchsin in the staining technique. Particular care was taken to search for yeasts, listing only in a general way the other organisms of the oral flora. The smears on the slides used for microscopic examination were all one square inch in area.

7. One-half cubic centimeter of inoculum was inoculated in a pour plate of Sabouraud's medium.

8. One-half cubic centimeter of inoculum was inoculated on Pasteur's agar medium in a Blake bottle.

9. Streak and center inoculations were made employing four large loopfuls of inoculum on Sabouraud's medium.

10. All inoculated media were incubated at 37° Centigrade for twenty-four hours followed by incubation at room temperature.

11. Daily examinations were made for yeast colony appearance and all suspicious colonies were picked onto the stock conservation media after staining for morphological study.

12. Maltose, dextrose, saccharose, and lactose meat extract broths were inoculated to determine (a) fermentative property, (b) pellicle formation and incubated at 37 degrees for one hundred and twenty hours.

13. Cultures were grouped according to their fermentative property and pellicle formation.

In the final group of thirty cases, twenty-four were found to be yeast positive (80%) and six were yeast negative (20%), according to the technique used for the isolation in this series.

Chart Number II represents a general compilation of the food ingested, separated into yeast positive and yeast negative groups. No analogy could be drawn as to which types of food were predis-

CHART II

FOOD INGESTED

FOOD INGESTED 8-12 HOURS PRECEDING COLLECTION OF SPECIMENS

Case Number	Fruit Vegetables	Meats	Sea Foods	Dairy Products	Bakery Products	Beer Wine
Yeast Negative (Culturally)						
1	X	X	—	X	X	X
2	X	X	—	X	X	—
3	X	X	X	X	X	—
6	X	X	—	X	X	—
8	X	X	X	X	X	—
13	X	X	—	X	X	—
14	X	—	—	X	X	X
15	—	X	—	X	X	X
16	X	X	—	X	X	—
17	X	X	X	X	X	X
18	X	—	—	—	X	—
20	X	X	—	X	X	X
21	X	X	—	X	X	—
26	X	X	—	X	X	X
28	X	—	—	X	X	—
30	X	X	—	X	X	—
31	X	X	—	X	X	X
32	X	X	—	X	X	X
35	X	—	X	X	X	—
39	X	X	—	X	X	—
40	—	—	—	X	X	—
41	X	X	—	X	X	X
42	X	—	X	X	X	—
Yeast Positive (Culturally)						
12	X	X	—	X	X	—
22	X	X	—	X	X	—
43	X	—	X	X	X	—
44	X	X	—	X	X	—
45	X	X	—	X	X	—
46	X	X	—	X	X	—

posing factors in yeast positive cases. However it was noted that those individuals partaking of beer or wine were yeast positive. The six yeast negative cases had not partaken of such beverages. In general the foods ingested by the yeast positive and yeast negative individuals was markedly similar and no distinctive variation was noted between the two groups.

Among the yeast positive group, twenty individuals took regular care of the teeth and four exercised little or no care; among the yeast negative cases all six took regular care of the teeth. Thus from these observations it could not be predicted from the care of the teeth, whether or not yeasts could possibly be isolated. However it was of interest to note that from the four cases who exercised no care of the teeth all were yeast positive, and likewise all the yeast negative cases exercised regular care of the teeth.

Among the yeast positive group, four were females and twenty were males, while among the yeast negative cases there were five males and one female.

It was of interest to note in Chart Number III the fact that by microscopic examination yeasts were found in only five out of twenty-four cases, which later were found to be all yeast positive culturally. All the yeast negative cases culturally were also yeast negative microscopically.

Among the cases in the preliminary series that were yeast negative, but that were yeast positive in the final series were Numbers 5, 6, 8, 13, 14, 16, 17, 18, 21, 26, 28, 32, 35 (thirteen males and one female), thus indicating the value of the modified technique in isolating yeasts.

The low percentage found microscopically may explain the fact that many workers do not mention yeasts as a part of the normal mouth flora, a few listing only Oidium albicans.

In this investigation a detailed study of the oral flora was not undertaken. However in Chart Number III a brief tabulation of the oral flora as found microscopically is given including a notation of the presence of yeast.

CHART III

SUMMARY OF GENERAL MICROSCOPIC FINDINGS IN FINAL THIRTY CASES

Gram Neg. Rods	Gram Pos. Rods	Gram Pos. Diplococci	Gram Neg. Diplococci	Streptococci	Staphylococci	Tetrads	Filaments	Epithelial cells	Spirilla	Yeast cells	Case No.	Sex
Yeast Positive (Culturally)												
X	—	X	X	X	—	—	—	X	X	—	1	male
X	X	X	X	X	—	X	—	X	—	X	2	male
X	—	X	X	X	X	X	X	X	—	—	3	male
X	X	X	X	X	—	X	—	X	X	—	6	male
X	X	X	—	X	X	—	X	X	—	—	8	male
X	—	X	X	X	X	—	X	X	X	—	13	male
X	X	X	X	X	—	—	X	X	X	—	14	male
X	X	X	X	X	—	—	—	X	—	X	15	male
X	X	X	X	X	—	—	X	X	—	—	16	male
X	X	X	—	X	X	X	X	X	—	—	17	male
X	X	X	X	—	X	—	X	X	X	—	18	male
X	X	X	X	—	—	X	X	X	X	—	20	male
—	X	X	X	X	X	X	X	X	—	—	21	male
X	X	X	—	X	X	—	X	X	—	—	26	male
X	X	X	X	X	X	—	—	X	—	—	28	male
X	—	X	—	X	X	X	—	X	X	—	29	male
X	—	X	X	X	—	X	—	X	X	X	30	female
X	X	X	—	X	—	X	X	X	—	X	31	female
X	X	X	X	X	—	—	X	X	—	—	32	female
X	X	X	—	—	X	—	X	X	X	X	35	male
X	X	X	X	X	—	X	X	X	—	—	39	male
X	X	X	X	X	X	—	—	X	—	—	40	female
X	X	X	X	X	X	—	—	X	—	—	41	male
X	X	X	X	X	—	X	—	X	X	—	42	female
Yeast Negative (Culturally)												
—	X	X	X	X	X	—	—	X	X	—	12	male
X	—	X	—	X	X	—	X	X	—	—	22	male
X	X	X	X	—	X	—	X	X	—	—	43	female
X	X	—	X	X	X	—	X	X	X	—	44	male
—	X	X	X	X	X	—	X	X	X	—	45	male
X	X	X	—	X	X	—	X	X	X	—	46	male

Among the twenty-four cases found to be yeast positive, the following summary indicates the cultural methods utilized in isolating yeasts according to those from which yeast was successfully isolated.

CHART IV

SALIVARY

Sabouraud's			
Streak	Giant	Pour	Pasteur's
		Salivary	
18	18	17	9
		Swab	
8	8	8	5
		Saline Rinse	
21	20	19	10

In Chart Number IV in the twenty-four cases which were yeast positive, the salivary streak method produced eighteen cases which were yeast positive. Saline rinse technique is revealed as a more satisfactory procedure than the salivary method and both of these are superior to the swab technique. The streak and giant inoculations were closely approximated in result by the pour inoculation, those three being superior to that one employing Pasteur agar.

Reference to Chart Number V shows a consistency of yeast types according to the grouping utilized, inasmuch as only two types were found.

1. Fermented maltose and dextrose but not saccharose or lactose.

2. Failed to ferment or form pellicle with maltose, dextrose, saccharose or lactose.

According to the classification by Henrici (33), the former belonged to his Group III and the latter belonged to Group IV.

The finding of yeasts of only two types is in accordance with the findings of Starkey and Henrici (36), although they were not examining saliva, but soils. They found thirty-eight of eighty-seven soil samples from various sources to contain yeasts; from these yeast positive soils only four different yeast cultures were obtained.

Media and Reagents Used

The following media and solutions were utilized in this investigation, all being made up according to the formulas commonly detailed for their preparation: Sabouraud's Differentiation Media,

CHART V

COMPOSITE OF YEAST CULTURES ISOLATED FROM THE FINAL THIRTY CASES

Fermentation				Pellicle				
No. of Colonies	Dextrose	Maltose	Sucrose	Lactose	Dextrose	Maltose	Sucrose	Lactose	Case No.
26	X	X	—	—	X	X	X	X	1
54	X	X	—	—	X	X	X	X	2
13	X	X	—	—	X	X	X	X	3
57	X	X	—	—	X	X	X	X	6
23	X	X	—	—	X	X	X	X	8
None	X	X	—	—	X	X	X	X	12
13	X	X	—	—	X	X	X	X	13
23	X	X	—	—	X	X	X	X	14
45	X	X	—	—	X	X	X	X	15
8	X	X	—	—	X	X	X	X	16
13	X	X	—	—	X	X	X	X	17
19	X	X	—	—	X	X	X	X	18
27	X	X	—	—	X	X	X	X	20
37	X	X	—	—	X	X	X	X	21
None									22
7	X	X	—	—	X	X	X	X	26
19	X	X	—	—	X	X	X	X	28
39	X	X	—	—	X	X	X	X	42
55	X	X	—	—	X	X	X	X	30
40	X	X	—	—	X	X	X	X	31
10	X	X	—	—	X	X	X	X	32
34	X	X	—	—	X	X	X	X	35
57	X	X	—	—	X	X	X	X	39
39	X	X	—	—	X	X	X	X	40
57	X	X	—	—	X	X	X	X	41
26	X	X	—	—	X	X	X	X	42
None									43
None									44
None									45

Sabouraud's Conservation Media, Liebig's meat extract broths with 2 per cent. of sugar added, Sterile Salt Solution, Czapek's Solution. Pasteur's Solution, and Dox and Thom Modified Czapek's Solution. An initial discouraging factor of the latter three media was the fact that a heavy precipitate settled out and it was impossible to obtain a clear medium in all cases. Filtration through filter paper did not clarify them. On comparison of Formulæ in various references which, differed somewhat, the resultant product always yielded an insoluble precipitate in the media. However, the media was used according to

the following procedure: one-half cubic centimeter of a known yeast-positive inoculum (Case No. 2) was placed on the medium and incubated at 37° C. for twenty-four hours and examined subsequently at room temperature incubation. Negative findings were observed insofar as the finding of yeasts were concerned. Realizing that the media had been of value, however, in culturing yeasts, it was thought that perhaps if the media were converted to a solid media by the addition of agar to a degree of 2 per cent., it would give worthwhile results. One-half cubic centimeter from a known yeast positive saliva (Case No. 2) was inoculated to the media in Blake bottles and incubated at 37° C. with a daily examination. The results were positive for yeasts and good growth was obtained. It was thought that probably the reason for obtaining growth on the media was due to the decreased oxygen tension in Blake bottles.

Summary and Conclusions

1. Yeasts were found in normal mouths, the percentage of positive cases approximating 80 per cent. of those examined.

2. A technique is presented, which increased the number of positive cases isolated.

3. Two main groups of yeasts were found according to differences in sugar fermentations and pellicle formation.

4. Yeast types were found to be constant in normal individual cases.

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ABSTRACTS FROM AND REVIEWS OF THE LITERATURE OF THE SCIENCES SUPPORTING PUBLIC HEALTH

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Tentative Methods of Drug Analysis. Compiled by Marian E. Lapp. J. Assoc. Official Agr. Chem. 20, 81, 1937. The following assays are several of those, tentatively adopted by the Association of Official Agricultural Chemists at its Fifty-second Annual Meeting.

Theophylline

This assay is applicable to solutions and tablets. Place 0.2-0.3 gram of theophylline, or an equivalent quantity of solution or of powdered tablets into a separator, add 5 cc. of 0.5 N sodium hydroxide and shake gently until the alkaloid is dissolved. Introduce a strip of litmus paper and add, from a buret, sufficient 0.5 N hydrochloric acid to produce a distinct acid reaction; then add 0.5 cc. more of the acid and 30 cc. of chloroform-isopropyl alcohol mixture (3 + 1) and shake for one minute. Allow to settle and draw off the lower layer into a second separator containing 10 cc. of water acidified with hydrochloric acid, shake well, allow to settle, and filter the solvent into a weighed flask through a pledget of cotton placed in the stem of a funnel. Repeat the extraction with six more 20 cc. portions of the solvent, wash each portion through the second separator, and pass the solvent through the filter into the weighed flask. Test for complete extraction by a seventh shaking with 10 cc. of solvent and evaporation of the solvent from this portion in a separate container. Recover most of the solvent and evaporate the remainder on a steam bath while rotating the container in an inclined position. Add 2 cc. of absolute ether to the residue and evaporate (cautiously to avoid spattering),

Dry the residue at 80° C. to constant weight and weigh as anhydrous theophylline.

Cinchophen in Presence of Sodium Bicarbonate

Take a representative number of tablets, ascertain the average weight and grind to a fine powder. Transfer a weighed sample, sufficient to yield 0.3-0.4 gram of cinchophen, to a separator, add 10 cc. of 4 per cent. sodium hydroxide solution to dissolve the cinchophen, neutralize with 10 per cent. hydrochloric acid solution and add 2 cc. in excess. Extract with five 25 cc. portions of a solvent containing alcohol, ether and chloroform (1 + 1 + 2) and collect the extracts in a second separator. Wash with 25 cc. of water and filter the extracts into a beaker. Extract the wash water with 15 cc. of solvent and filter into the same beaker. Test for complete extraction. Evaporate the solvent to dryness on the steam bath. Dissolve the residue in 60 cc. of alcohol, neutralized with 0.1 N sodium hydroxide using phenolphthalein as indicator, and then titrate with 0.1 N sodium hydroxide to a permanent pink color. Each cc. of 0.1 N alkali is equivalent to 0.02491 gram of cinchophen.

Dinitrophenol (or its Sodium Compound)

Reagents

(a) Sodium hydroxide solution—2 grams in 100 cc. of water.

(b) Hydrochloric acid—35 to 37 per cent.

(c) Potassium iodide solution—20 grams in 100 cc. of water.

(d) Bromide-bromate solution—0.1 N solution. Dissolve 2.7835 grams of potassium bromate and 12.5 grams of potassium bromide in enough water to make 1 liter. If necessary, standardize against 0.1 N sodium thiosulfate (see *Methods of Analysis, A. O. A. C.*, 1935, 551, 26 (c)).

(e) Sodium thiosulfate solution—0.1 N solution.

(f) Starch solution—Mix 2 grams of finely pulverized potato starch with cold water to make a thin paste. Add 200 cc. of boiling water with constant stirring.

Determination

Weigh 0.18-0.20 gram of 2-4 dinitrophenol (or sufficient of the preparation to contain that quantity) into a 100 cc. beaker, dissolve

in 25 cc. of water, using sufficient 2 per cent. sodium hydroxide solution to insure solution and transfer to a 500 cc. glass-stoppered flask, using water for washing. Dilute the solution with water to about 100 cc., add 25 cc. of 0.1 N bromide-bromate solution and 10 cc. of hydrochloric acid. Immediately stopper the flask and swirl vigorously for one to three minutes. Remove the stopper quickly and add 5 cc. of potassium iodide solution, taking care to avoid loss of bromine; immediately stopper the flask and shake thoroughly for about one minute. Remove the stopper and rinse down the neck of the flask with water. Titrate the solution with 0.1 N sodium thiosulfate, using starch indicator near the end point. Each cc. of 0.1 N bromide-bromate is equivalent to 0.0092 gram of 2-4 dinitrophenol, or 0.0103 gram of anhydrous sodium dinitrophenate. F. X. M.

Bath Preparations. Ralph H. Auch. *Soap 13,* 4 (1937). The author has investigated the sales of bath salts and advances reasons for the product of English manufacture outselling those of American producers.

The following bases are used in the manufacture of bath salts, sodium chloride, sodium carbonate, trisodium phosphate, borax and sodium sesquicarbonate. Most of these substances present some disadvantageous characteristic, either that of solubility, difficulty in tinting or inability to soften water. Sodium sesquicarbonate alone being the product for which no disadvantages are noted.

Methods for tinting and scenting the salts are given, the processes involving spraying; immersing the crystals in the tinting and scenting mixture and the use of a simple mixing device with vertical or horizontal blades. Colors should be light and alkali fast. Since the perfume is dispersed as a thin film on the surface of the crystals, a resinous fixative should be used.

Bath tablets are usually made to effervesce by the introduction of sodium bicarbonate and tartaric acid, the premature reaction being prevented by mechanically coating the particles of bicarbonate and acid with cornstarch of low moisture content. Tablets of the non-effervescent type have proved undesirable due to the necessary inclusion of starch as a disintegrator which in turn produces a cloudiness in the bath water.

The bath milks which have appeared on the market in powder form may contain one of the water softeners and may or may not

contain any milk solids; they may contain powdered soap or sulfonated fatty alcohols to make the water sudsy, the milkiness usually being due to finely dispersed zinc oxide or titanium dioxide.

The bath oils, which are sold extensively by department stores are usually given a pine odor and are used either by sprinkling in the tub or rubbed lightly on the body prior to the bath. A suggested basic formula for a bath oil contains a water or alcoholic solution of sulfonated castor oil or olive oil with perfume and color added.

H. P. F.

Incompatibility Between Syrup of Tolu and Ammonium Carbonate. J. R. Hill, *Pharm. J. 84,* 323 (1937). The author reports experiments explaining the dark color developing in the following prescription:

Ammon. Carb.	ʒiii
Syr. Tolu	℥vi
Sig. ʒi 3 times a day.	

In order to trace the cause of the discoloration the various chemical substances considered to be present in syrup of tolu were combined separately with ammonium carbonate in solution, namely, benzoic acid, cinnamic acid, benzyl benzoate and vanillin. The first three remained colorless whereas the vanillin solution with ammonium carbonate became a reddish color immediately gradually changing to brownish and finally black with a black precipitate. The reaction is considered to be analogous to the oxidation of pyrogallol in alkaline solution. Vanillin in only 1-4000 solution was found to produce this color reaction on exposure. Sodium bisulfite failed to prevent the reaction in the presence of the alkali. The incompatability apparently cannot be remedied.

L. F. T.

The Colorimetric Method for the Determination of Traces of Phenol in Water. G. U. Houghton & R. G. Pelly, *Analyst 62,* 117 (1937). The presence of extremely minute quantities of phenolic substances may give rise to an "iodoform" taste in water which is subsequently purified by chlorination, and over 10 p. p. m. of tar acids in a river water may prove toxic to fish life. The method of Folin and Denis which employs phosphotungstic-phosphomolybdic acid, giving a blue color with phenol, is not specific for aromatic compounds.

The objection to the method of Fox and Gauge, which depends on the formation of a yellow or red dyestuff when phenol is coupled with diazotized sulphanilic acid, is that the reagent gives a slight yellow color with certain vegetable substances present in surface waters, and, being applied in alkaline solution, difficulties may arise through precipitation of calcium and magnesium salts. The Baylis method suffers from the disadvantage that the color develops slowly with small concentrations of phenol and the solution must stand for a long period before matching; as well as the narrow pH limit for maximum color production.

The methods suggested by the authors are for waters in which the phenol content is greater or less than 0.15 p. p. m. If the amount of phenol is greater than 0.15 p. p. m. the method is as follows: to 100 ml. of the sample add 2 ml. of 5 per cent. aqueous solution of sodium carbonate followed by 2 ml. of filtered diammine reagent (by reducing a 0.1 per cent. aqueous solution of *p*-nitrosodimethylaniline with zinc dust) and sodium hypochlorite solution (containing 0.05 per cent. available chlorine), the latter being run in from a burette until the solution is free of any red tinge, a large excess being avoided. The phenol content is obtained by matching against known phenol standards.

When the phenol content is less than 0.15 p. p. m. the following modification is suggested: to 200 ml. of the sample in a separatory funnel add 4 ml. of the bicarbonate solution followed by 4 ml. of the diammine solution. Then gradually add sufficient hypochlorite solution just to discharge the pink color which first appears. Extract the indophenol with pure carbontetrachloride, dry the extract with anhydrous sodium sulphate, make up to a definite volume, and match in Nessler tubes against standards prepared in exactly the same manner.

A table, showing excellent agreement between added and found quantities of phenol, is given in the article. W. G. B.

Geranium Oil. H. J. Monroe, *Soap 13,* 4 (1937). The devaluation of the monetary unit of France has caused the first important price change in years in geranium oil. This oil, used extensively by the soap manufacturer to impart the odor of rose to his product is produced from plants grown mainly on the Island of Reunion (Island of Bourbon) and in Northern Africa. Turkey, France,

Spain, British East Africa and Russia also supply varying amounts of the product.

The oil is distilled from the leaves of various species of Polargonium, the Island of Reunion devoting about 30,000 acres to the production of this shrub. The plant grows best at an altitude of 1300 to 2000 feet. Oil from plants grown on this island contains a high percentage of rhodinol, which when extracted is used in the production of rose compounds. The French and Spanish geranium oil is very delicate and persistent in odor, is used in fine perfumery material, the price being too high for use in ordinary perfume and soaps. The Turkish oil is of the heavy Bulgarian type rose odor and is used mainly for the production of geraniol. The oil from plants grown in British East Africa, the Belgian and French Congo and in Russia lacks the rose odor of the oil from other sources.

The fact that geranium oil does not discolor soap; that it is stable even in soaps of high alkali content and that it needs no fixative but blends well with other oils increases its value to the soap maker.

H. P. F.

The Oxidation of Vitamin C. C. R. Addinol, *Merck Report 46*, 4 (1937) No. 2. Within a space of four years following the identification of ascorbic acid (cevitamic) as vitamin C, the pure crystalline vitamin has been synthesized and made available in commercial quantities. Its high reducing power would seem to indicate its role in promoting the proper cellular oxidation and reductions in cellular tissue.

The use of Tillman's Reagent (2, 6 dichlorophenolindophenol) provides a good test for indicating the presence of vitamin C in a foodstuff. This may also be modified as a quantitative microchemical test as follows: The sample is ground with sand and trichloracetic acid and then the acid extract titrated against a measured volume of 2, 6 dichlorophenolindophenol which has been standardized against a solution of ascorbic acid of known strength, in turn standardized against iodine. It is essential to work in acid solution since it is known that certain naturally occurring reducing agents such as glutathione and certain phenolic compounds tended to reduce the indicator in neutral or alkaline solution.

Ascorbic acid has been shown to oxidize in two steps. The first stage is reversible in which the ascorbic acid is transformed into dehydroascorbic acid. This oxidized form is physiologically active

but less stable than ascorbic acid since it can change irreversibly into the physiologically inactive 2, 3 diketo-*l*-gulonic acid without further oxidation being required. Further oxidation transforms the products of the first stage of oxidation into *l*-threonic acid, oxalic acid and carbon dioxide. In the presence of atmospheric oxygen aqueous solutions of ascorbic acid are very slowly oxidized under acid or neutral conditions. The rate of oxidation is greatly accelerated by increased alkalinity and, in the presence of sufficient oxygen ends in the formation of oxalic and threonic acids. In solutions whose pH is less than 4 the oxidation stops at the first stage and can be reversed with H_2S. Atmospheric oxidation is accelerated by minute traces of copper and by oxidases such as those present in potato and pumpkin but it is retarded by salts, biological extracts and erythrocytes. Dehydroascorbic acid at pH greater than 4 undergoes a spontaneous irreversible transformation forming an acid possessing no antiscorbutic activity. This change as has been mentioned above is not dependent upon air or oxidizing agents. The reason that the very unstable dehydroascorbic acid has a high potency in vivo whereas it losses potency rapidly in vitro is because of the reducing action of glutathione in the tissues reversing it to ascorbic acid. It is of interest to note also that in the degradation of dehydroascorbic acid a complete loss of antiscorbutic activity is produced more quickly than is the property of being reversed by reduction with H_2S. Thus the regeneration by H_2S, the reduction of dichlorophenolindophenol, iodine, silver nitrate or methylene blue is not specific for the presence of vitamin C since in the degradation of dehydroascorbic acid substances are formed which react positively with these reagents but are without antiscorbutic activity.

In crystalline form ascorbic acid is stable on exposure to air although on long standing it becomes slightly yellow. In aqueous solution the vitamin gradually oxidizes but experiments with 1 per cent. solutions are reported which had lost only 14 per cent. of their activity on a week's standing. Neutralized solutions are more liable to oxidation but solutions in ampules sealed under an inert gas are stable indefinitely.

In the human body the vitamin is rapidly carried to the tissues where it is maintained in the reduced active form until it is excreted in the urine. Tests for the vitamin C content of urine are complicated by the fact that many other substances react with Tillman's reagent.

Fresh fruit and fresh milk are physiologically potent as are freshly prepared solutions of vitamin C. Only on exposure to air and light are these solutions irreversibly oxidized to physiologically inactive material. Where it is not possible to isolate crystalline ascorbic acid from the test material, the biological assay is still the safest indication of the antiscorbutic action of material containing vitamin C. L. F. T.

American Mistletoe. F. J. Desantis and E. V. Lynn, *J. Amer. Pharm. Assoc. 26,* 219-20 (1937). Although mistletoe has been used for the treatment of certain ailments since prehistoric times, it is only recently that scientists have found a basis for its application as a drug since it has been reported that extracts of the dried plant are more or less effective in the reduction of high blood pressure. However, in these studies, often taxonomic precision has been lacking—little distinction being made between the species which are assumed to belong to the genus Viscum. By extension of this assumption, American mistletoe, Phoradendron flavescens, might be expected to act in the same way—an expectation which is not backed up by the few pharmacological studies which are inconclusive (claims having been made that it gives both a rise and a fall in blood pressure).

The author obtained American mistletoe of unknown origin in the market and from it obtained the following data:

Successive Extractions

Moisture	6.44	Pentosans	3.80
Ash	10.68	Benzin, volatile	0.08
Crude fiber	26.59	non-volatile	3.47
Tannin	3.87	Ether, volatile	0.03
Protein	15.14	non-volatile	1.62
Reducing sugars	4.48	Alcohol	16.53
Starch by acid	9.51	Water	22.46
by diastase	1.23		

From their tests for ether-soluble alkaloids, the authors conclude that these can be present only in very small amount.

No crystalline glucosides were isolated.

There is indication, however, that some choline derivatives are present. M. S. D.

Sterilizing Lamps. Science-Supplement. 85, 18 (1937). The day when man will fight and conquer micro-organisms of disease and decay with the sun's rays or their laboratory-made equivalent seems to be drawing near. Steps already taken in this direction were described by A. R. Dennington, of the Westinghouse Lamp Company, at the Toronto meeting of the Canadian Section of the American Institute of Electrical Engineers. Sunlight can kill micro-organisms even when its ultra-violet and infra-red rays are filtered out. The rays of shorter wave-lengths, from 2,537 Angstroms down, are the most effective germ-killers. Such rays harnessed in a lamp which has an extremely thin indrawn window or glass bubble are already being used by physicians to destroy the germs of skin infections. At the opposite extreme are the eight sterilizing lamps installed over the operating table at Duke University Hospital to sterilize air during surgical operations and thus prevent wound infections.

For keeping meat safe by preventing mold growth during the tenderizing storage period, and for keeping mold out of bakery products, there is the tubular lamp made of special glass and resembling the blue neon sign tube. Other lamps that give off sterilizing rays are being investigated in the hope of developing a ray method of sterilizing milk. The ultimate hope of investigators in this field is to find ways and means of purifying the air to offset the danger of breathing in germs that are constantly being breathed out into the air. L. G.

The Comparative Efficiency of the Commonly Used Flavoring Agents. H. N. Wright, *J. A. M. A. 108,* 12 (1937). Valuable information regarding the ability of various flavoring agents of the U. S. P. and N. F. to disguise the bitterness of some drugs, to cover the saline taste of two much used chemical salts and to disguise the unpleasant taste of Tincture of Digitalis is made available by a series of tests in which the students of the medical, dental and nursing schools of the University of Minnesota Medical School participated. In some cases the preparations were tested on more than 600 individuals, the group study having been carried on since 1933.

The preparations used were given a rating on a percentage basis, according to their efficiency, and comprehensive tables are included in the article.

Syrup of Cacao N. F. V, Syrup of Prepared Cacao N. F. VI, Syrup of Raspberry N. F. VI, Syrup of Orange U. S. P. and Syrup of Cherry N. F. VI appealed most strongly to the majority of the individuals as a pleasant tasting vehicle; all rating above 50 per cent. in the score; while Syrup of Cocoa N. F. V, Syrup of Raspberry N. F. VI, Aromatic Syrup of Eriodictyon N. F. VI and Syrup of Prepared Cacao N. F. VI all received a rating above 50 per cent. for their ability to disguise the bitter taste of quinine bisulfate. Quinine bisulfate in 0.1 per cent. strength was used since it was considered by the writer to produce a bitterness of a greater degree than is produced by a solution of codeine sulfate containing ½ gr. to the teaspoonful.

The salty and burning taste of ammonium chloride when used in an 8 per cent. solution was found to be best disguised by Syrup of Cinnamon, Syrup of Orange, Compound Syrup of Sarsaparilla, Aromatic Syrup of Eriodictyon, and Syrup of Citric Acid; all of which attained a score of 50 per cent. or over in this study.

For disguising the unpleasant taste of Tincture of Digitalis when used in the proportion of 0.5 cc. to 3i, Syrup of Raspberry, Syrup of Prepared Cacao N. F. VI, Aromatic Syrup of Eriodictyon, Syrup of Cherry and Syrup of Citric Acid proved to be the most effective agents.

An interesting comparison is made between the efficiency of Syrup of Prepared Cocoa of the N. F. VI and Syrup of Cocoa of the N. F. V in the ability of these syrups to disguise the bitter taste of drugs. H. P. F.

The Comparative Pharmacognosy of the Anterior and Posterior Lobes of the Pituitary of Cattle. H. W. Youngken, *J. Amer. Pharm. Assoc. 26,* 108-114 (1937). This is an excellent article in which the author studies histologically and pharmacognostically preserved and desiccated whole pituitaries, preserved and desiccated anterior and posterior lobes and powdered, desiccated anterior and posterior lobes of cattle. Celloidin and paraffin sections of the whole pituitary and its lobes were cut in vertical and horizontal planes, variously stained, mounted and examined. Desiccated material was macerated in warm water, dissected under the binocular dissecting microscope, representative portions then being transferred to slides, teased apart and examined separately in various stains and in water. Powdered desiccated

materials were examined after being mounted in water, or in various stains, or after having been fixed to slide, with diluted Mayer's albumen, dried, stained, washed, dehydrated, cleared and mounted.

The elements of the stained and mounted powders were studied and identified by comparison with similarly stained and mounted sections and fragments of the gland.

The stains used included Weigert's hematoxylin with and without copper acetate, mordant solution, Delafield's hematoxylin, alcoholic eosin, aqueous eosin, Mallory's stain, Mann's stain, etc. Penfield's modification of Del Rio-Hortega's silver carbonate method was employed for pituicytes.

The paper clearly points out the histological features of beef pituitary. The anterior lobe was found to be composed largely of more or less polygonal epithelial cells arranged in solid branching cords and alveoli surrounded by connective tissue in which are found capillaries, non-medullated nerve fibers and neuroglia. Chromophile cells (one kind with alpha and another type with beta granules) and chromophobe cells can be distinguished by the use of a combination of copper-hematoxylin and eosin stains and Weigert's differentiator.

Sections of the posterior lobe are devoid of alpha- and beta-granule—containing chromophile cells.

The pars intermedia possesses incomplete alveoli of epithelial cells partially surrounded by connective tissue. The alveolar cells are eosinophilic.

Pituicytes and ground substance form the chief elements of the posterior lobe. The processes of the pituicytes are more shrunken and contracted in the powder than in the sections. M. S. D.

Fixing the Time of the Administration of Poison in a Case of Chronic Arsenic Poisoning. M. L. Van Itallie, *J. Pharm. et Chemie, 129,* 97 (1937). The analysis of the arsenic content of the hair has been cited to determine the time of administration of the poison in cases of chronic poisoning. The absorbed arsenic in the body is partly eliminated through the hairs, which process begins about fifteen days after the administration of the poison. The quantities of arsenic for the various parts of the hairs will depend on the time of the poisoning and the distance that separates the part of the examined hair from

the root. The normal quantity of arsenic in 100 g. of hair is about 0.01 to 0.03 mg. whereas in cases of poisoning the quantity of arsenic exceeds 500 or more times the normal quantity.

The average growth of human hair is about 1.5 cm. per month. Thus it is possible by measuring the distance of a part of the hair from the skin to determine the time when this part of hair had been in contact with the skin and consequently absorbed the arsenic. The content of arsenic gives an indication to fix the time of the poisoning. An analysis carried out upon a large quantity of hairs can indicate with more exactness the period at which time the first deposit was effected, the time when the maximum has been attained, the return to a certain minimum, and also when the normal quantity is reached. Two cases have been examined. The hairs, in both cases, have been cut in such manner that all of the basal parts were in the same side, and the apical parts in the opposite side. A fifty-nine year old woman was concerned in the first case, who, in 1934, had been a victim of arsenical poisoning. Arsenic was found in her hairs, nails and urine. She showed a generalized polyneuritis and melanosis (condition characterized by pigmentary deposits). The patient no longer attended the clinic in March 1935, but remained under the control of polyclinic. In September of 1935 it was possible to obtain a band of arsenic out of 190 mg. of her nails. In the beginning of 1936 the melanosis appeared again, and polyneurosis was aggravated. In May of the same year the melanosis had spread out considerably, the skin became scaly, and the hairs of the arm-pit and pubis fell off. A tress of hair 20 cm. long was divided into three parts, as indicated below.

Free part |—a (6 cm.)—|—b (7 cm.)—|—c (7 cm.)—| basal part

The arsenic content of 100 Gm. of hairs was:

1.96 mg. in part a.
1.31 mg. in part b.
0.47 mg. in part c.

Estimating the growth of the hairs as 1.5 cm. per month, 20 cm. of hair will represent a period of 13-14 months. The beginning of the part b will be attained after four to five months; the part c after nine to ten months.

From the results of analysis the following conclusion is drawn. An arsenical poisoning occurred thirteen months ago. This was followed by a new poisoning which happened again, probably after four to five months. Such a conclusion has been supported by clinical evidence.

In the second case the length of hairs was 42 cm.; it was cut 1.5 cm. away from the head.

The parts analyzed have been divided as follows:

Free part $\frac{d}{21\text{ cm.}}|\frac{c}{8\text{ cm.}}|\frac{b}{8\text{ cm.}}|\frac{a}{1.5\text{ cm.}}$ qasal part

The arsenic content of 100 g. of hair was as follows:

0.142 mg. in part a (about 5 months).
0.86 mg. in part b (about 11 months).
1.815 mg. in part c (about 17 months).
0.27 mg. in part d (about 32 months).

The conclusions in the second case were that a simple poisoning occurred more than a year and a half ago, the arensic content of the hairs had not yet come back to the normal three years after the poisoning, and the total elimination of the arsenic from the hair would not be effected. B. M.

Fever Treatment. Science-Supplement, 85, 12 (1937). Fever treatment does not cure disease by killing disease germs. In diseases like syphilis and gonorrhea, fever should be used with chemical treatment as a means of building up resistance of organs and other body tissues against the germs of the diseases so that "the infection must eventually die away by itself." Professor Julius Wagner-Jauregg, Nobel laureate, who originated fever treatment for the mental disease, that is the late stage of syphilis, gave this explanation of how fever helps cure disease in a message to the First International Conference on Fever Therapy. The conference, of which he is honorary chairman, opened in New York on March 29th.

Contradicting those who believe that the high artificial fever cures by killing the disease germs, Professor Wagner-Jauregg pointed out that the spirochetes of syphilis are present in the human organism for different periods of time. They are still capable of living even after a successful treatment with artificial fever, whether induced by

malaria or by physical means such as short-waves or fever chambers. The same holds true for the organisms of gonorrhea. The patient, however, is well after successful treatment.

Professor Wagner-Jauregg first tried malarial fever as a cure for general paralysis of the insane latter stage of syphilis, in 1917. His success with this kind of fever treatment, in which the fever was produced by deliberately giving the syphilitic patient malaria, started a world-wide wave of fever treatment. Long before 1917, however, Professor Wagner-Jauregg had tried to cure mental diseases by artificial fever. In 1891 he made his first attempts, using tuberculin. Some of these early patients recovered and "enjoy the best health even now, after more than 20 years," according to Professor Wagner-Jauregg. Even before that, as early as 1897, he held that the high fever does not kill the germs, but is an index of the intensity of the curative process running its course. L. G.

Ships May Get "Sick" Through Germ Attacks, Science News Letter, March 27, 1937. That bacteria may play a part in making ships "sick", is suggested by the researches of Dr. Claude E. ZoBell and Esther C. Allen of the Scripps Institution of Oceanography. Dr. ZoBell and Miss Allen immersed set glass slides in the ocean and studied the first forms of life that adhered to them. The first "settlers" were always bacteria—as many as 4,500,000 to a square inch of glass in twenty-four hours.

Nothing would really stick to the glass unless it was submerged from two to four hours. Time is required for the bacteria to cement themselves to the glass, but once they do so running water will not dislodge them.

Larger forms of life, that can be seen without a microscope, did not appear on the slides until they had been submerged for more than three days. Barnacle larvæ were occasionally found on slides submerged for a week, during the summer months.

The studies of Dr. ZoBell and Miss Allen suggest that the film of bacteria, which bulks up to as much as 9 per cent. of the total mass of the living foreign matter clinging to the hulls of ships, may aid larger plants and animals to attach themselves to submerged surfaces. Perhaps it serves as a natural adhesive, or it may possibly supply food during their early stages. Possibly, too, it may serve as a protection

against the various kinds of poison paint with which shipowners try to protect their property against these swarming "submarine hitch-hikers". L. G.

The Structure of the Antibody. Science-Supplement, 85, 10 (1937). Dr. Sanford B. Hooker, professor of immunology at Boston University, in giving the presidential address before the American Association of Immunologists, meeting in Chicago on March 24, reviewed current researches on the antibody.

It is considered to be a kind of protein molecule formed by certain body cells when influenced by an antigen such as the toxin of the diphtheria bacillus. This protein molecule, called antibody globulin, is different from other globulin molecules. It has, probably at the surface of each molecule, specific combining groups. The antigen molecule, formed by the bacteria, also has combining groups at its surface. The union of these two is important in producing immunity. Antigen molecules have many combining groups. not necessarily of the same kind. Antibody molecules, formed by the body's cells, have each only one or a relatively few combining groups. The combining groups are thought of as more or less complex patterns of binding points. Those on the antibody molecule are distributed in a pattern that is the mirror image of the binding point pattern of the antigen. The antibody binding points have electrical charges which are the opposite of those carried by the antigen binding points.

One kind of combining group, it is assumed, must contain at least three properly adapted points which differ from those of another kind of combining group in atomic nature, spacing and sign and strength of electric charge. A single kind of antigen combining group, if sufficiently complex, may call forth somewhat different kinds of antibody. The perfect "master-key" antibody molecules would be those which most faithfully and completely reflect the physical characters which determine the specificity of the antigen. Such antibody molecules would have binding points which could unite effectively with the antigen binding points and neutralize the antigen.

The same antiserum may contain grades of more imperfect and dissociable antibodies extending to the poorest kind whose pattern is so incomplete as to have the last affinity permissive of any recognizable association with antigen. The more of these high-grade antibodies in an antiserum, the more effective will be the serum in protecting against disease. L. G.

Industrial Cancer. Science-Supplement, 85, 12 (1937). Dusty air, such as miners, stone cutters and many others work in all day long, is a health hazard and may cause diseases like silicosis, but it is probably not a cause of lung cancer in this country. This is the conclusion of a study reported by Drs. Arthur J. Vorwald and John Karr, of Saranac Laboratory, Saranac Lake, N. Y., at the meeting in Chicago of the American Association of Pathologists and Bacteriologists.

The tendency to regard inhaled dust as a cause of lung cancer was prompted by reports from mining districts in Europe. The number of cases of cancer among miners there is unusually high. The ore dust in these mines is radioactive and therefore induces changes in the lungs which eventually develop into cancer. These observations do not justify the conclusion that all dusts cause cancer. The great majority of dusts are not radioactive and do not, so far as known, contain cancer-producing substances. If they did, the amount of lung cancer in men and experimental animals exposed to occupational dusts for long periods of time should be unusually high. A survey of patients suffering from pneumonokoniosis, the lung condition that is due to breathing dusty air, and observations on patients and animals at the Saranac Laboratory do not support this view.

Cancer and tumors of the bladder can be caused by prolonged exposure to aniline dyes. Experimental proof for this long-suspected relation between the tumors and exposure to the dyes was obtained in studies reported by Drs. W. C. Hueper and H. D. Wolfe, of Wilmington. L. G.

Secret Processes Used for Perique Tobacco. W. E. Doucet, *J. New Orleans C. P. II,* 6 (1937). In St. James Parish, Louisiana, a tobacco is grown which, when cured, becomes coal black. This tobacco, called Perique, stands alone in its use throughout the world as a means of giving strength and character to other tobaccos.

Tobacco cultivation in Louisiana began in 1750 when the French Government was in power, and rivalled the production of indigo. Failure of the indigo crop caused France to agree to purchase all of the tobacco produced in Louisiana. Production reached its climax in 1802, and then cultivation spread to Kentucky and Carolina, where superior tobacco was produced.

Production of tobacco in Louisiana seemed doomed, when in 1824 Pierre Chenet discovered a new process for curing a new type of tobacco leaf. He closely guarded his secret and was nicknamed "Pierre qui parle pas" (Pierre who does not talk). The tobacco became known as "Pierreque" and finally "Perique." Although the secret was held in the family for years, a traitor finally divulged the process to others. In spite of this Perique has never been produced anywhere but in St. James Parish, as there seems to have been something wrong in the technique of the traitor's process. The difference between Perique and other tobaccos lies in the curing of the leaf in its own juice.

The leaves are cut, the midrib removed and the halves bound together in the form of a twist. These are subjected to pressure for twenty-four hours, the pressure released and the twists permitted to absorb the exuded juice. This process is repeated again and again, each time at a greater pressure, until the leaves acquire a coal black color and no more juice exudes. Often a year's time is required to effect a perfect cure, as the longer the process takes, the better the quality of the tobacco.

The leaves are then rolled with the aid of a cotton cloth into a pipe-like cylinder and the ends bound together. The finished product looks like a miniature horse collar, weighs about five pounds, and is called a "Carrotte." Even today these carottes are used by the natives as a medium of exchange for the necessities of life.

There is no overproduction of Perique, and the supply never exceeds the demand. This is partly due to the time and patience required for the curing process. The makers of the product are descendants of the Acadian exiles of Nova Scotia, and consider Perique an inheritance which must be preserved and handed down to succeeding generations as unchanged in quality as when first discovered.

E. MAC L.

The Cinnamon Industry in Ceylon. J. C. Dreiberg, *Spice Mill, 60,* 84 (1937). From the earliest times most of the market requirements for cinnamon have been met by Ceylon. When the spice was a luxury it commanded a price of £8 for a pound. Cinnamon was then growing in a wild state, but at the end of the eighteenth century its

systematic cultivation was taken up by the Dutch in Ceylon. They established government gardens and gave lands to the people for cultivation under strict regulations for care, handling and quantity of production, thus establishing a government monopoly.

When the British arrived in 1796 the cultivated areas were limited, and by 1833 the government gardens had fallen into a state of neglect. Lands were abandoned due to the decline in market prices and the prohibitive export duty. In 1841 the government cinnamon department was abolished, and the tax remaining from the days of the Dutch removed. Up to this time inferior cinnamon, chips and scrapings were used for distillation and only the best quills exported, but in 1867 it was felt that it might pay to market the chips as well. This accompanied a decline in quality and the cheaper Cassia bark (Cinnamomum cassia) was employed for many of the uses for which Ceylon cinnamon (Cinnamomum Zeylanicum) was considered suitable. Competition and the marketing of a product of poor quality caused the prices to decline, so that in 1902 there was little margin of profit for the cultivator. About 45,000 acres were under cultivation at this time. Since then cocoanut plantations have replaced much of the acreage which has been partly transferred to regions of poor soil quality. During the last forty-five years the total area in cinnamon has decreased by 14,000 acres.

Exports of cinnamon from Ceylon amounted to 5,200,000 pounds in 1935, an increase of 200,000 pounds over 1934. Since 1923 the ratio of chips to quills exported has been greatly reduced. Although the total quantity (chips and quills) exported has increased in the last ten years, the value has declined from Rs. 4½ millions to 1⅓ millions per year. Central American countries take 40 per cent., and Mexico alone, 27 per cent. of Ceylon's total export, and attempts are now being made in South America to cultivate cinnamon to supply this demand.

Cinnamon, once the chief export of Ceylon, is now a minor one with 26,000 acres under cultivation. The production is entirely in the hands of the Ceylonese, mostly on small areas of ten to twenty-five acres. Trees for cinnamon production are coppiced to produce willowy shoots about ten feet high. These are cut, the bark peeled and rolled into quills. Branches are cut in the fourth year if the tree is healthy, four-foot pieces of bark stripped, placed around sticks and allowed to ferment for a short time so as to remove objectionable

substances. A pale yellow parchment-like bark is the result. Smaller quills are inserted into the larger and after drying form the rods which are rolled and bundled. Chips, trimmings and leaves are distilled for the oil. The commercial products are the quills, chips and the oil.

The possible causes for the deterioration of quality and depreciation of the market for Ceylon cinnamon may include the adulteration with wild cinnamon barks of inferior species, the effect of soil conditions due to moving of the plantations, careless handling to secure quantity at the expense of quality, lack of proper attention during cultivation and the exportation of chips in quantities disproportionate to quills. However, 1935 prices show an increase of 10 to 15 per cent. over the previous year, and imports especially to Mexico an increase of 35 per cent. E. MAC L.

The Prevention of Drying-Out in Culture Media. M. C. Terry, *Science, 85,* 319 (1937). One of the problems of the small clinical laboratory although a lesser problem in other laboratories is that of keeping culture-media ready for use, particularly Loeffler's medium, blood-agar slants and blood-agar plates. For this purpose and for preservation of stock cultures a material called parafilm (made by the Marathon Paper Mills Co., Rothschild, Wisconsin) was found useful. A square of this film pressed down on the mouth of a culture tube, the cotton plug having first been pushed in, keeps the slant from drying out for weeks at incubator temperature and indefinitely at room temperature. It is equally efficient in keeping the volume of a broth tube or flask unchanged. The advantage over wax or paraffin is that the seal is readily stripped off and the cotton plug remains perfectly manageable. An inch-wide strip carried around the cover of a Petri dish and pressed down on the bottom of the dish allows prolonged incubation of a plate culture. Poured plates thus sealed are stacked for storage with waxed paper between to keep them from sticking together. The security of the seal may be seen in the following experiment: (1) 10 cc. of alcohol in a graduated centrifuge tube lost nothing in volume in four days, during which time the same quantity in a cotton-stoppered tube, both in the 37° incubator, went down to 7 cc.; (2) a tube of water at 54° kept the level unchanged for nine days, during which time the control went down an inch.

L. G.

THE FOOD VALUE OF BERRIES

Review by Arno Viehoever

In connection with the growing interest in natural food products as a supplementary diet, as a source for fruit juices or vitamines, a brief survey appears justified. The most recent work on certain berries has been carried by C. R. Fellers and co-workers of the Massachusetts Agr. Exp. Station, published in its bulletins and contributions.

I. Blueberries

Although botanically related to the huckleberries, the blueberries, as a rule, are larger, have a milder, sweeter taste, and contain much smaller and more numerous seeds. The low-bush variety, Vaccinium pennsylvanicum, a dwarf type, mainly provides the berries for the canning companies in Maine. The berries are collected from the bushes for several years, then new bushes are grown in semi-cultivation. The high-bush blueberry, Vaccinium corymbosum, first cultivated in 1911 by F. V. Coville, botanist of the U. S. Department of Agriculture (see Nat. Geogr. Magazine 1911 and 1916) through propagation by cuttings, is more common in Massachusetts and the swamps of boggy areas with acid soil in New Jersey. It has delicately flavored berries, reaching one-half inch in diameter.

The moisture content, as an average, is high, namely 87 per cent. for the cultivated and 84 per cent. for the wild blueberries. The soluble solids (sugars), furnishing energy, are present in fair amounts, averaging 11.6 per cent. in the fresh fruit and varying from 76.46 to 86.49 per cent. on the moisture free basis. The other constituents are low, crude protein varying from 3.14 to 4.37 per cent., the ether extract (fat) from 2.13 to 4.69 per cent. and the ash from 1.25 to .158 per cent. when calculated on the moisture free basis. Various workers found the berries high in manganese (esp. in V. pennsylvanicum) when compared with other fruits, high in iron, limited in calcium and poor in phosphor. The South Carolina blueberries, on a dry basis, yielded 206 parts per billion. The usual plant mineral substances were found in the ash with the alkaline elements predominating.

Blueberries contain both vitamins A and C. The amounts of A in both wild and cultivated is low (about one International unit per gram) and the amounts of C only fair (0.8 I. unit per gram for one wild bush—and 1. to 1.5 I. unit per gram for four cultivated varie-

ties). Seven grams of fresh or frosted blueberries or 10 grams of kettle-cooked canned berries were necessary to protect a 300 grain guinea pig from scurvy. Almost complete loss of vitamin C results from defrosting and refreezing.

Of organic acids 0.002 and 0.0021 per cent. of benzoic acid were found in high-bush blueberries and no quinic acid. When adding 300 grams of blueberries to the basal diet of young men the blood alkali reserve was not lowered nor was there an increase in titrable or organic acid in the twenty-four-hour urine, as the organic acids of the blueberry were oxidized in the body.

II. Cranberries

The American cranberry, Vaccinium macro-carpum, is botanically related to the smaller European Preisselbeere Vacc. vitis idaea and "Moosbeere", V. oxycoccus. F. W. Morse, Research Professor of Chemistry of the Massachusetts Agricultural Experimental Station, a few years ago, investigated 116 different lots of cranberries representing 61 distinct varieties from Massachusetts, New Jersey and Wisconsin.

The total acid content varied from 1.87 to 2.71 per cent., the total sugar content from 2.45 to 5.66 per cent. While the total acid content remained nearly the same during ripening on the vines, the total sugar content rapidly increased during ripening. In fact the samples with lowest sugar content were collected before they were actually ripe, that is, highly colored as an indication of maturity.

During prolonged cold storage the sugar content is lowered due to respiration, while the acid content decreases only slightly, provided the berries remain sound.

Clague and Fellers found an average of 2.35 per cent. and a range of from 2.08-2.8 per cent. of total acids, calc. as citric acid. The acidity is partly due to benzoic acid, varying from 0.029 to 0.098 per cent., with an average of 0.065, high enough to give a preservative action, though not a germicidal one. The benzoic acid, at least in part, is combined as esters and occurs, according to Griebler, in amounts up to .35 per cent. as the glucoside vaccinin, the antiseptic value of which is unknown.

Cranberries also contain up to 1 per cent. quinic acid. This acid, in special tests, did not exert any appreciable antiseptic nor germicidal effect on organisms as yeast and molds, causing fruit spoilage. Neither

could soluble solids and the pectin present be correlated with the keeping quality.

While the acidity in sound cranberries is quite high (pH 2.35) and conditions appear ideal for preservation of the berries, fruit rot, nevertheless, causes up to 25 per cent. of the total crop in the U. S. Ingenious machines have been worked out such as one separating the sound berries from those with soft spots which do not, as the good ones, bounce over a rotating rod, on which they travel, when hit by hammerlike protrusions.

Hippuric acid is found in the urine, collected over a twenty-four-hour period, proportional in amounts to the quantity of cranberries consumed. Its formation is assumed to be due to the breakdown of quinic acid or a glucoside yielding quinic acid upon hydrolysis.

No decrease in the blood alkali reserve occurred after eating such normal amounts as 22-54 grams of fresh cranberries or the corresponding 2-5 ounces of cranberry sauce. Five times their amount, however, decreased the CO_2 combining capacity appreciably, causing a mild to moderate acidosis.

CONTROL OF INTERNAL PARASITES

Review by Arno Viehoever

In the control of human parasites we can learn much from the efforts made to control internal parasites in animals. The ideal control method for parasites in animals, according to general agreement, is the mass feeding of anthelmintics. Feeding therefore a mixture of copper sulfate and salt in proportions 1:30 and 1:50 (appr. ½ pd. per sheep per month) Rietz (see Bull. 271, Agr. Exp. Sta., Morgantown, W. Virginia) found the treatment inadequate for the control of the nematode parasites. Some sheep suddenly died with toxic symptoms: general icterus (jaundice); enlarged, soft, yellow liver; swollen dark soft kidneys; hemorrhagic bladder and a dark brown urine. A blue precipitate, found in these tissues, proved to be a deposit of copper, responsible for the poisoning.

The feeding of these anthelmintic mixtures was therefore replaced by drenching of the animals every three weeks with either 1½ per cent. solutions of copper sulfate or with a mixture of equal amounts of each 1½ per cent. solution of copper sulfate and 1½ per cent. nicotine sulfate (Black Leaf 40). These mixtures are used in amounts of 2-3 ounces, according to the age of the animals.

I. Effect of Copper Sulfate

Sheep No.	Nematode ova per gram of feces September, Start of Experiment	Condition of sheep September, Start of Experiment	Nematode ova per gram of feces February, End of Experiment	Condition of sheep February, End of Experiment
5	21000	Fair	0	Good
10	900	Poor	0	Good
20	800	Fair	0	Good
31	1400	Poor	100	Good
48	700	Fair	100	Good
217	1800	Poor	100	Good
122	17000	Poor	0	Good
123	17500	Poor	200	Good
124	400	Good	200	Good
130	1600	Poor	100	Good

As shown in Table I the general condition of the sheep materially improved during the five months of treatment. The number of nematode eggs per gram of feces was greatly reduced from a calculated average of 6200 to 80 at the end of the experiment.

II. Effect of Copper Sulfate-Nicotine Sulfate Mixture

Sheep No.	Nematode ova per gram of feces September, Start of Experiment	Condition of sheep September, Start of Experiment	Nematode ova per gram of feces February, End of Experiment	Condition of sheep February, End of Experiment
30	400	Fair	0	Good
50	700	Fair	100	Good
45	100	Good	0	Good
51	1500	Fair	0	Good
52	13500	Poor	100	Good
85	0	Good	0	Good
86	600	Poor	...	.....
125	11000	Poor	0	Good
126	4200	Poor	0	Good
127	13200	Poor	400	Good
219	15400	Poor	200	Good
220	1500	Fair	0	Good
221	17100	Fair	400	Good

As shown in Table II the general condition of the sheep was similarly improved after this treatment. The nematode infestation practically disappeared as the number of the nematode eggs was reduced from a calculated average of 6000 to 100 per gram of feces at the termination of the experiments.

RECENT STUDIES ON POLIOMYELITIS

By Louis Gershenfeld, P. D., Ph. M., B. Sc.

Summary of Panel Discussion—Poliomyelitis. J. L. Morse, *Maine M. J. 28,* 13 (1937). There is given a discussion of poliomyelitis. Among the problems to be solved in the future are: the importance of antibody development by the use of vaccine, the prophylactic treatment by the spraying of the nasal mucosa with picric acid, and the treatment of the disease itself. The use of convalescent serum is considered valueless.

Experience with the Picric Acid-Alum Spray in the Prevention of Poliomyelitis in Alabama, 1036. C. Armstrong, *Am. J. Pub. Health 27,* 103 (1937). Alum, picric acid, or a mixture of both, when instilled into the nostrils of monkeys, tend to prevent central nervous system involvement following subsequent introduction of poliomyelitis virus by the same route or even via the blood stream. During the Alabama epidemic of 1936, the prophylactic value of a nasal spray consisting of 0.5 per cent. each of picric acid and sodium aluminum sulfate in 0.85 per cent. saline solution, was tested on human subjects. Thorough spraying is essential to maximum protection. The actual incidence of poliomyelitis in the group, sprayed, by whatever method, was somewhat less than the calculated incidence based upon the rate in the unsprayed control group.

Passive Prophylaxis Against Poliomyelitis. S. D. Kramer, *J. Pediat. 10,* 111 (1937). Attempts to evaluate convalescent serum by inoculating children in times of epidemics have not been sufficiently controlled to give statistical results. The clinical impression is that convalescent serum is of some value prophylactically in poliomyelitis.

A Consideration of the Present Methods of Treatment of Poliomyelitis. (Review.) K. D. Nichol, *M. Times & Long Island M. J. 65,* 67 (1937).

RECENT REPORTS ON WHOOPING COUGH

By Louis Gershenfeld, P. D., B. Sc., Ph. M.

Denmark Vaccinates for Whooping Cough. Science News Letter, March 13, 1937. Denmark has begun to vaccinate all its children against whooping cough, hoping to add this disease to smallpox and diphtheria as ills from which little children need not die.

This news was brought to America by Dr. Thorvald Madsen, director of the Serum Institute, Copenhagen, and president of the Health Section of the League of Nations.

Whooping cough is the most serious disease of children in Denmark. It ranks ahead of diphtheria and scarlet fever. In a group of 1,000 unvaccinated children this disease killed 26. In a group of 3,900 vaccinated, there were only 6 deaths. Such figures have convinced Danish health authorities of the desirability of vaccination. The vaccine will be given as early as possible in cases of whooping cough which may develop. It has been found to lessen the severity and shorten the course of the disease.

Passive Prophylaxis Against Pertussis and Chicken-pox. E. B. Shaw, *Am. Acad. Pediat.,* proc. (5/11-12/36); through *J. Pediat. 10,* 98 (1937). Passive prophylaxis against pertussis and chicken-pox by the administration of the human convalescent serum has not been proved successful. In the case of pertussis, this method may be of some value, but convalescent serum appears to possess no value in chicken-pox.

A Correction

Antiseptics in Obstetrical Practice. S. Pearson and J. Urner, *Mod. Hosp. 47,* 67 (1936). An interesting study on the use of antiseptics in obstetrical practice was presented covering the use of three different antiseptics and five methods of their application to patients prepared for delivery. The use of a spray method of preparing patients for delivery was recommended and iodine *applications had yielded a very high percentage of positive cultures and had not* revealed better germicidal action than merthiolate and metaphen.

NOTE: The italicized line was inadvertently dropped from this abstract (p. 92—February) and because such omission completely changes the complexion of the abstract, it is here reprinted in full.

SOLID EXTRACTS

By Ivor Griffith, Ph. M., Sc. D.

Despite the form in which this information is presented it may be accepted as trustworthy and up-to-date. Original sources are not listed but they may be obtained upon request.

The other day a learned medico actually blamed Aqua Philadelphica for causing kidney stones, charging that much maligned fluid with being too rich in indescribable solids. Actually there are more potential crystalline solids in one potato than in a whole gallon of Philadelphia water, whether it be of the variety Schuylkilliensis or Delawariensis. And as for those who seek the springs of Fairmount to escape the banalities of spigot water—the joke is on them, for the solid content of the waters of many Fairmount Park springs in quantity and kind, is more and worse than that of our regular water; and especially when those springs draw some of their essence from the carcassy effluvia of the aristocratic cemeteries that monotonize and monopolize the surrounding hills and dales of fair Fairmount.

Some years ago an enterprising neophyte in chemistry discovered that soluble lithium salts when boiled in a test tube with urinary calculi, of the uric acid and urate type, promptly dissolved them. And immediately thereafter came the lithium craze in medicine. Lithium tablets, lithium waters and lithium in many another form came to be the fashionable gout, rheumatism and kidney stone dissolver par excellence. It did not occur to practitioners that the patient or some of his spare parts had to be boiled in a gargantuan test tube in order to realize the effectiveness of the lithium reaction.

However, it is a strange commentary upon the stubbornness and ignorance of some people that lithium compounds are still prescribed and that lithia tablets are still swallowed by the hundreds.

Numerology and astrology, according to a recent writer, are more popular today than they have ever been. Despite our so-called advance in education, there are still those who foolishly believe that benedictions and banalities are both born of the stars—still those who like their dreams done "medium", and plenty more who seek their fortunes in tea leaves and ten-spots and trust their birthdays, not their birthrights, to redeem their souls.

Sciosophy or systematized ignorance—that most delightful science in all the world, because it is acquired without labor or pains, and keeps the mind from melancholy—is still the popular science, and its votaries are legion.

Gout (podagra) is a constitutional disease alleged to be produced by crystal misbehavior. Sodium urate and other urates deposit on the articular surfaces of the small joints and eventually in the arteries, the heart valves and elsewhere. Nature is usually quite impartial, and while her gallstones are most frequently destined for the speaker sex —the male gets the gout. And the male who adds the insult of alcoholic and dietary excess to the injury of an inactive life is the common complaining sufferer.

Curiously enough the point of concentration for an attack of gout is the great toe and the helix of the ear, a penalty imposed, according to Paracelsus, for kicking too much and for listening to much that should not be heard. In any event it is more than likely that gout and many of these crystal pathologies start in the kitchen, or the dining-room, and that a rational diet, fitting to the individual, is a safety factor not to be ignored.

Under the caption "But Dentists Don't Use—Powder," the Dental Cosmos *prints the following interesting statement:—*

The following resolution of the Raleigh (N. C.) Dental Society was unanimously adopted by the North Carolina Dental Society at its annual meeting in May, 1936:

Whereas, we, as members of the dental profession, feel that one of our most important health service duties is to educate our people in the proper care of their teeth; and

Whereas, the Dr. Lyon's Tooth Powder, manufactured and sold by the R. L. Watkins Company, Newark, N. J., in their radio advertisement repeatedly makes the statement that "ninety per cent. of the dentists clean teeth with powder," which we believe is incorrect and unfair to our profession; therefore, be it

Resolved, that we, the members of the Raleigh Dental Society, condemn and label as untrue the statement made by the radio announcer on the national program of the R. L. Watkins Company, and further suggest that a true statement of the facts will place both the dental profession and dentifrice manufacturers in a position more to be desired.

Accepted Dental Remedies, 1935, states:

There is no essential difference in the cleansing properties of a tooth powder over a tooth paste. Indeed, it is well known that pumice or silica used for prophylaxis is made into a paste with glycerin or water before application to the teeth.

Which is only further proof of our contention that the rape of the radio is a disgrace not only to the advertiser but to the broadcasting authorities as well.

From an article on colloids appearing in one of the so-called Digests comes the following indigestible morsel:—

"In the Colloidal Laboratories of America they have a motion picture which is as weird as anything ever shown on a screen,—a movie of a headache. The actors are the nerves in a human head, magnified millions of times. You *see* the headache. Those nerve ends are tangled, twisting, writhing. Then you see the colloids enter. These rescuers, smaller than the blood corpuscles themselves, march straight to the spot where there is an *unbalance* of the vital metals. You see those laboratory-prepared colloids restore normalcy there at the seat of the trouble. Then you see the nerves cease their twisting, relax, and assume their proper position. Shades of Old Doc Munyon!

"Dr. Steinmetz, the wizard of electricity, devised a method of utilizing colloids in the treatment of sinus trouble. The Bide-a-Wee Home, New York's famous hospital for cats and dogs, can cure mange in three days, where it used to take three months. A large midwestern city was freed from the scourge of goiter when colloidal iodine was added to the water supply. A famous institution for the treatment of alcoholism is experimenting with a colloidal solution of gold which apparently not only overcomes the effects of evcessive drinking, but removes the craving for liquor as well."

Of course that is one way to popularize Science, but there is a far better way—and a truthful way!

Karl Friedrich Mohr, inventor of many of our now commonplace laboratory appliances, such as the automatic burette, the cork-borer, the pinch-cock, the specific gravity balance, etc., was a plain-spoken, bunk-hating practical man. He had no sympathy for writing that was unnecessarily involved. In one of his letters he wrote: "The greatest fear of some 'scholars' is that their utterances may be too easily under-

stood and that they, therefore, may appear to be of this world. A sure sign of this is the use of integrals on the second page of a treatise. When an ordinary man would say 'I light a cigar' these learned persons of the first rank declaim 'Let the cigar be a *and myself* ϕ. *In so far as I light the cigar, I am a function of* a *and the flame is the exponent. Therefore, this act may be written as the equation,* $\phi = fa^m$. *What is the net result?. The 'scholar' simply smokes his vile cigar."*

One of the oddest quirks of biologic routine is that freakish phenomenon that fancies the fair, the fat and the fortyish—and fills their gall bladders with an assortment of calculi—gallstones that too often grow to be tombstones. These gall-concretions number anywhere from one to a thousand, and range in size from pinhead to plum. And they are just as diversified in chemical composition. Cholesterol, that carbon-rich crystalline alcohol, erstwhile a resident of epidermal cells, and a precursor of vitamin D, is the most common ingredient of gallstones. Then comes a compound of lime with bile pigments. Less frequently we find the several salts of calcium, chalk, plaster paris, the phosphate, the oxalate, etc. Traces of copper, iron, zinc and manganese, mercury, silica, globules of fat, uric acid and urates have also been reported present.

One inquisitive surgeon found the nucleus of an oddly shaped gallstone to have been a needle, a fact which should not alarm the modern woman, who rarely sees needles except in the victrola.

These formations generally originate from definite nuclei, usually not of crystalline structure. Masses of epithelia, agglutinated bacteria or small sedimentary clots or masses attract to them concentric layers, of crystal or amorphous fragments. In the words of a modern musical composition the crystals grow around and around, but unfortunately they do not "come out *here*", but remain *there,* until the gleeful surgeon opens the subject and bails them out by the handful.

In a country that goes wild over excesses, and glorifies marathon dancers and parents of quintuplets, what shall be said of one Wilhelmina Strossman, of Austria-Hungary, whose excised gall bladder displayed 17,082 rounded gall-concretions, and who after their removal lived at least long enough to count them.

Just what causes gallstones in some and not in others is still a debatable matter. A disorderly diet, infection, vitamin lack, congenital predisposition, electrical deposition, all have been charged as responsible for gallstone formation.

You may Zonite and spray
Your mouth if you will,
But the scent of the onion
Hangs 'round it still.

But chemists are now inquiring whether the weeping of cooks over onions, and the persistence of the odor of the garlic may not be reflections of their value in medicinal directions.

The very chemicals in onions and garlic which bring tears to the cook's eyes and offense to many a sensitive nose are now found to have germ-killing powers which may be useful in fighting disease. The germ-killing, tear-starting chemicals have been isolated for the first time by Dr. Richard E. Vollrath and Dr. Carl C. Lindegren, of the University of Southern California.

The germ-killer from onions is allyl aldehyde, that from garlic is the less poisonous crotonic aldehyde. Tests are now under way to determine the usefulness of these substances in healing infectious diseases due to germs. The fact that onions do not spoil readily and have remarkable resistance to bacterial attack led to the present discovery.

Enteroliths or intestinal concretions are fortunately more common in animals than in man. Under the name of bezoar stones they were held in high esteem by the Arabs, especially as charms against the plagues. Later they came into great vogue in Europe. They were supposed to be obtained from the intestines of the Persian wild goat. Others were concretions from the stomachs of apes, formed much as the pearl is formed in the oyster. They are obtained from the animal by giving him an emetic, the primary difficulty being to catch the ape. Bezoar stones were crystal concretions of calcium phosphate built around an organic nucleus. They were used internally in 10 to 20 grain doses, or used as lavallieres on a string mostly as antidotes to poison and infections, and some were alleged to be worth ten times their weight in gold. It is said that as late as the eighteenth century, hundreds of pounds of bezoar stones, most of them "bootlegged", were sold annually in the apothecaries shops of London. One Scotch commentator of that period sarcastically notes that the majority of bezoar stones sold in that city had never seen the inside of a goat or an ape until an Englishman swallowed them.

BOOK REVIEWS

Done by persons, unafraid to upbraid, but perfectly willing to give praise where praise is really due.

QUANTITATIVE PHARMACEUTICAL CHEMISTRY. By Glenn L. Jenkins and Andrew G. Du Mez, McGraw-Hill, New York. Second edition, 466 pages including appendix and index.

The purpose of this book as described by the authors is to furnish students of pharmacy with a systematic course covering the quantitative physical and chemical methods in the U. S. P. and N. F. With the advent of the new Pharmacopœia and National Formulary the authors have revised the former edition in order to properly present the quantitative methods now recognized. The new edition is arranged in three parts. Part I treats of general methods of gravimetric and volumetric analysis. Part II considers the numerous physico-chemical methods involved in drug assay. Part III contains the many special methods of pharmaceutical analysis such as ash and moisture determination, assay of volatile ores, alkaloidal assay, enzyme evaluations, etc. Logarithmic tables comprise the appendix followed by the index.

The presentation of the official methods of analysis is excellent in that the methods are outlined in detail and the purposes of various steps clearly explained. Such a treatment makes the book very valuable not only to the student but to the practicing pharmaceutical chemist.

Certain of the theoretical considerations in the field of physical chemistry are possibly not given sufficient treatment, e. g. titration curves, choice of indicators, etc. The index also is far too abbreviated for such a wealth of subject matter. These criticisms are of a minor nature, however, and the book as a whole is a worthwhile successor to the previous edition.

L. F. Tice.

PRINCIPLES OF PHARMACY. Fourth edition, by Henry V. Arny, with the collaboration of Robert P. Fischelis. W. B. Saunders Company, Philadelphia, 1937. 1139 pages. Cloth. $8.00.

In the world of pharmaceutical education, there has never been any problem in finding a text-book, for there are a number available. The problem, however, has been in finding a complete, up-to-date text-book which has followed close in the wake of the great progress pharmacy and medicine are ever making. And that is why the various texts are revised,—these revisions, for the most part, being published very soon after the issuance of new volumes of the two "official books", the U. S. P. and the N. F.

Dr. Henry V. Arny has attempted to follow this custom with his "Principles of Pharmacy", now appearing in its fourth edition, the others having appeared in 1907, 1917 and 1926. This present revision, placed on the market more than a year after the U. S. P. XI became official, has seemingly failed to keep up with the times. Certain phases of pharmacy are neglected entirely, while others, as for example, the treatise on newer developments in emulsions, are summarily set aside with several sentences, and even then the sentences are not always absolutely correct. Some of the illustrations, too, show evidence of having come down through the years. It is true that many of the principles of pharmacy remain the same, but half tones and line cuts can very conveniently and very advantageously be changed, if only for art's sake.

Dr. Robert P. Fischelis, well-known writer and lecturer, has been called in to collaborate with the senior editor, and has, in the parts charged to him, done a commendable piece of work.

Extensive bibliographies, appended to the various subject divisions, are extraordinarily good, and afford splendid collateral reading references. Most of the tabular matter and graphic formulæ are very helpful, especially to students.

However, it must be borne in mind that the task of presenting all of the principles of present-day pharmacy in one book is a tremendous undertaking.

J. E. Kramer.